Individual Delta ISB Comments on the Draft Delta Adapts Adaptation Plan

January 21, 2025

The Delta Stewardship Council has published a draft Adaptation Plan as part of its climate initiative, Delta Adapts. The draft details strategies and actions to improve regional resilience to climate change, including adaptation costs and governance recommendations. The draft Adaptation Plan and supporting documentation are now available for public review and comment through **February 18, 2025**. The Delta ISB will discuss its comments on the public review draft at its January 29, 2025, meeting and identify overarching comments/themes. Below are individual comments for each of the chapters.

Contents

Executive Summary:

What is good?

1. Outreach and engagement with socially vulnerable groups and EJ expert groups and tribal consultations, also broad outreach to other actors (growers' agencies, and residents).
2. Prioritization of equity also is great – clearly defined and methods for determining social vulnerability are explained. The need for sustainable funding is a strong highlight.
3. Clearly acknowledges the difference between adaptation and mitigation and establishes why the focus is on adaptation. Recognition of how regional adaptation strategies outside of the Delta will affect the Delta.
4. Support for streamlining processes for groundwater recharge during high precipitation events and the need for Delta ISB reviews of current regulatory effectiveness for meeting water quality objectives.
5. The layout of the Executive Summary is very useful. It is helpful to highlight key priorities for major chapters. It provides many useful ideas for adaptation.
6. The section on Equity and Delta Adapts is well stated and much needed. Equity is discussed multiple times throughout the document. The text is generally repetitive in its content. Equity is major consideration and must be highlighted. However, this is a document about adaptation to climate change and there should always be a connection from everything (including equity) to adaptation. The connection of equity to adaptation is less apparent in Executive Summary and Chapter 10, while the connection is clear in Chapters 4-7. I wonder about the effectiveness of repeated statements about this important topic, when a single major statement followed by Chapters 4-7, and 10 that make direct connection of equity to adapting to climate change might be more impactful and better convey the message.
7. The section on Adaptation Approach is clear, the four focus areas nicely organize the plan, and brings to the front the always challenging and very important issue of trade-offs.
8. Clearly lays out the critical importance of the greater Sacramento-San Joaquin Delta for the people, ecosystems, and economy of California.
9. Highlights the need to consider climate change holistically in implementing the Delta Plan and other adaptation actions.

10. Effectively references the roles of foundational studies, acts, and reports, such as the Delta Reform Act, Delta Plan, and Climate Change Vulnerability Assessment (CCVA), in preparing Delta Adapts. Figure 1-1 is particularly useful.
11. Recognizes key pillars in Delta Adapts, including adaptive management, best available science, reduced reliance on the Delta for water supply, land-use planning, community engagement, and equity.
12. Prioritizes adaptation strategies based on ease of implementation, co-benefits, and time and future cost constraints.
13. Addresses future challenges, such as trade-offs among strategies and funding.
14. Develops adaptation strategies targeting vulnerable areas such as floods, ecosystems, agriculture, and water supply, as identified in the CCVA.

What's Missing:

1. Fire is missing from the discussion of climate risks (ES pg. 2, first paragraph). Even fires outside of the Delta could affect how water supplies within the Delta are used downstream, or the availability and quality of supplies upstream). Fig. ES-1 does not show actions to reduce fire risk. Is land-use planning only targeting ecosystem restoration and agriculture? What about areas where novel ecosystems are likely to emerge?
2. Uncertainty around costs and benefits of adaptation is not really addressed
3. Lack of clarity around whether the prioritization criteria focuses on community vulnerability or community priorities. It is ambiguous in the current document.
4. Discussion of governance challenges of regional strategies (especially those that extend beyond the Delta, but connect to the Delta), alongside the political challenges of key strategies like limiting development in flood-prone areas or improving the processes for groundwater recharge for water supply reliability.
5. The coequal goals idea is a critical concept. The first time it is used in the text, it should be very clearly stated and then clearly used throughout the document. Yet, on page ES-1, it seems there are three things listed as goals: water supply, ecosystem, and unique place.
6. Adaptive management is stated as a pillar of the Council's work but is never defined. It finally shows up again in Chapter 10.

7. On page ES-3, it is interesting that the **assumption** (as opposed to a strategy) is **reduced reliance** on the Delta for water supply. What is meant by water supply? Does this include agriculture?
8. I am surprised this document is a first step (ES-16). There has been a lot done leading up to this.
9. The Adapt Plan seems to use ecosystem restoration as a way to adapt to climate change.[1] This is not how much of restoration to date in the Delta has been done. Much of it has been designed to improve water quality and habitats, and many think of restoration as repairing or mitigating for damage already done. Some further explanation (a box?) of using restoration for adaptation may help. It becomes a central tenant of the entire plan, but as part of co-benefits. Note that the text cites a target of 60,000 to 80,000 restored acres but I do not think this target was designed with the idea of climate change adaptation so I unsure of its relevance here.
10. In the box on Key priority flood risk reduction actions, I was surprised to not see conservation to reduce or smooth out demand and thereby increasing flexibility of water operations. Indeed, flexibility is not emphasized much at all with flood risk reduction. Conservation is discussed later.
11. I am not sure what *"Use adaptive urban planning and farming practices to reduce risk"* means.
12. The report could benefit from a quantitative summary of key vulnerabilities, attribution (if possible), and potential compounding effects of drivers.
13. Insights into how vulnerabilities may evolve over time due to future climate change, along with how adaptation strategies are designed to maintain resilience dynamically.
14. Recognition that the CCVA was completed in 2021, and the climate projections used for Delta Adapts may now be outdated.
15. Consideration of how future changes in physical systems, such as increased wildfire frequency in upstream watersheds, may alter runoff characteristics.
16. Clear sequencing of adaptation strategies to ensure intended benefits and maintain resilience over time.
17. Another general comment is that a clear statement of the ecosystem services provided by the Delta would help. The term ecosystem services is

[1] The Role of Ecosystem Restoration for the UNFCCC and the Paris Agreement: https://www.decadeonrestoration.org/publications/role-ecosystem-restoration-unfccc-and-paris-agreement#:~:text=The%20UN%20Decade%20on%20Ecosystem,and%20adaptation%20to%20climate%20change.

used in the document more often as catch-all terms for other things on a listing of services, and seems to be used in a narrow sense about environmental-related. For example, many consider food provisioning as an ecosystem service.

18. It seems “biological diversity” is used for more than diversity itself but rather to represent the general state of health of the ecosystem. This should be made clear.

What can be improved?

1. Include the things mentioned in the What is Missing category
2. I found the executive summary to be very general and very broad. Typically, when I read an executive summary, I expect to get an overview of all the major points of a report. In this case, however, the executive summary covered the strategy, process, and role of the process taken in putting the report together, but then simply referred to the individual chapters for the actual results, findings, and recommendations. Because of this, I found the executive summary to not be serving its purpose well.
3. I am surprised that Delta Adapts is one of the first regional climate adaptations plans in California. I assume the next part of the sentence is the critical part: to simultaneously consider resilience from the perspectives of communities, watersheds, ecosystems, and infrastructure. I suggest you simply state what this report this. The type of statement as presently written can be mis-interpreted by readers. Why only in this plan? Does that mean this plan is highly uncertain or possibly mis-guided because no one is doing this? I think this plan generally sounds like others I have seen in other systems and is a natural evolution of our thinking of how to address the problem in the Delta.
4. Briefly discuss the methods or approach for incorporating feedback and evidence from the outreach efforts into the plan.
5. Adaptive Management approach: The report could benefit from more details on how to design an adaptive management approach that has accountability built in. As it is, the document doesn’t create an adaptive management framework to test the recommendations or even look at why they aren't being implemented currently.
6. Incentives for adaptation:

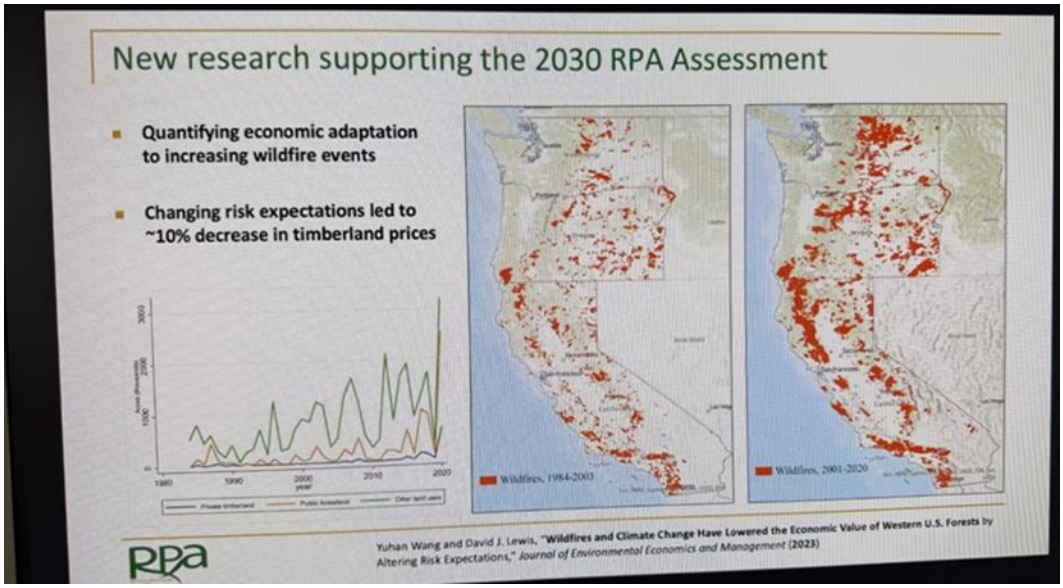
   a. It could be helpful to pay more attention to economic incentives for adaptation, rather than simply laying out potential solutions without clear pathways of implementation. Economic incentives have been shown to be highly effective at generating restoration actions and may be the only available means to influence behavior of private businesses, when other policy levers are absent. Many other regions have leveraged existing programs of federal and state governments or non-profit organizations to develop economic incentives that promote shared goals.
   b. Page ES-8 Res-2 Discuss and/or provide examples of ways to enhance ecosystems through incentivizing resilient land-use practices? What are examples of such practices? Also, the long-term climate trends are changing; so it is better to consider projected changes in trends rather than past trends.
7. Why is the ISB named once in the document (ES-14), somewhat oddly as reviewing water quality objectives. I suggest either the Delta ISB is named as a place for science review in general or not at all. Communicate to the Delta ISB expectations for review of the Delta Adapts Plan:
   a. Page ES-14: "Implement regular reviews by the Delta Independent Science Board to evaluate the effectiveness of current regulations at monitoring and complying with Delta water quality objectives." *Comment: Has this been discussed with the Delta ISB? What precisely is supposed to be reviewed? How often? Do we have the expertise?*
8. Notes and Recommendations on language used:
   a. Throughout the document, and especially in the Executive Summary, it can get confusing what is meant by co-benefits. This is defined much later in the document but even then, it is often used without reminders of what the primary benefit is. In general, primary benefit must be achieved and co-benefits can operate within that solution space
   b. I am not familiar with the term "re-wild." It conveys the idea of restoring to past ecosystem state, which most consider not feasible for the Delta.
   c. Some of the language seems, in places, to be out of character for a plan on actions for the system to adapt to climate change. For example, climate related changes "threaten" people (ES=1). Later in

the same paragraph it is explained and terms like “disrupt” and “impact” are used. This is an observation and it may be the intent.

d. The term “region” and “regional” seems to be used in multiple ways. The entire Delta is a region within the broader geography and then there are regions within the Delta.

9. Improve clarity around use of terms around water quality:
    a. The term “modify” is used for reservoir operations, water quality standards, and water infrastructure. That is a weak word. Perhaps “update” is better for water quality, “optimize” for water operations, and “modernize” for infrastructure.
    b. Pages ES-14 & 15, and Chapter 5 (5-4), Chapter 7: Several terms are used to describe water quality: (i) water quality objectives and (ii) water quality standards. Please clarify the difference or define in a glossary. If these terms are used as synonyms, please decide which one to use and only use one. From a regulatory perspective, they are not the same. If they are only used for salinity, why not just call it “salinity”? From an ecological perspective, using the term ‘water quality’ to describe salinity conditions is confusing if not misleading, as high salinity per se does not impair water quality for wildlife, but impairs water use for agriculture and human consumption. This term should therefore preferably be used in a broader sense to describe the extent of pollution, i.e. contaminants, nutrients, algal toxins, or dissolved oxygen/pH, which can be harmful to wildlife.
10. Page ES-6 – It would be helpful to discuss and define restoration and restored acres.
11. ES-12 - page 3-5– Is food security an issue that Delta Adapts can/should address? I suggest removing this topic or revising it.
12. There seems to be an emphasis on urban ecosystems and subsidence (ES-11). What is considered urban in the Delta? Maybe the reasoning is that most of the Delta is urban? Subsidence is clearly important but warming temperature is a major impact of climate change and greatly affects the ecosystems. I do not see anything explicit about temperature in the section on Ecosystems.
13. Recommend using the latest climate projections and modeling results for future Delta Adapts analyses.
14. Expand Figure 1-1 or include a flowchart illustrating the information flow from prior work.

15. Discuss uncertainties that could influence the success or failure of strategies, potentially chapter by chapter.
16. Recognize the rising costs of infrastructure (e.g., levees) and update cost estimates accordingly.
17. Develop an optimal sequencing framework for adaptation strategies and address dependencies.
18. Discuss the implications of wildfire here and in the body of the report. Note that (1) the figure below shows the great increase in fire risk expectations for the Delta and (2) fires in urban areas are releasing new types of toxins to the air and water as solar panels and home batteries burn.



Chapter 1: Introduction

What is good?

1. The process for creating the plan and the policy underpinnings are nicely explained and visualized.
2. The Council's role in the process, and the need for collaboration with other agencies within and outside the Delta is also clearly outlined.
3. Resilience goals are clear and comprehensive – go beyond just water supply and ecosystem restoration. The inclusion of governance as a resilience goal is critical.
4. Good explanation of the role of equity considerations in the process. Good discussion on the tribal history in the Delta, as well as the current

institutional challenges that impede tribal access to Delta lands and decision-making.
5. It is helpful to start by listing the diverse values and benefits of the Delta.
6. It is also useful to provide information on the various acts and plans that influence adaptation (pages 1-3 and 1-4).
7. Section 1.7 provides a useful introduction to the organization of the report.

What is missing?

1. The chapter could better recognize the need for ongoing collaboration with communities, tribes, and non-governmental organizations during implementation. The focus is more on the role of the Council in informing and educating the public and communities on climate change impacts and adaptive strategies.
2. Equity strategies – examples are helpful in the Box on pg. 1-11, but then it appears that only select strategies address equity, despite the fact that the text states that each strategy considers equity.
3. How tribal considerations are prioritizes in the strategies isn't really explained, despite a useful background section on tribal considerations and history in the Delta. The report talks about the need to interweave traditional knowledge into adaptation, but doesn't explain if this was done in the process of developing the strategies in the current plan.
4. Lack of recognition of wildfires in shaping the key vulnerabilities, or other uncertainties for the future. Key vulnerabilities appear to be stated as "knowns".
5. Adaptation is presented as a process that has an end state (e.g. Figure 1-1) rather than an aspiration goal.
6. It is unclear how various acts and plans mentioned on pages 1-3 and 1-4 fit together and interact.
7. The term "restore" is vague
8. Page 1-7 what is meant by "enhancing the Delta ecosystem" ?
9. Will changes in disturbance regimes affect the Delta?
10. Here again, the wording is less than straightforward about co-equal goals and enhancing the values of the Delta.

To improve?

1. Include the things mentioned in the What is Missing category
2. On page 1-3, it says this plan addresses steps 5-7 in Figure 1-1. But step 7 is Monitor and Implement and Chapter 8, while is good, is not implementation details and I do not see much discussion of monitoring. It seems this report is step 6?
3. Define what is meant by resiliency when it is first introduced (e.g., page 1-1) by moving the box on page 1-6 to be earlier in the text.
4. Consider making Figure 1-1 be circular (that is returning back to step 1 after step 7). In the text, recognize that adaptation is an ongoing process or an aspiration.
5. It would be helpful to show a flow chart (or diagram) of how the various acts and plans mentioned on pages 1-3 and 1-4 fit together and interact.
6. Page 1.6 box says, "This underscores a critical need to raise awareness of the threats posed by climate change and engage residents in adaptation planning for a resilient Delta." I think it should also say that the relationship between climate change and other threats needs to be made clearer.
7. Page 1.6 uses the term "restore" for the environmental goals but that is not define. For example, is the goal to bring back ecosystem services to some target, certain habitat conditions, or number of individuals of rare species or what? I realize the details are in the cited documents, but the term "restore" seems a bit nebulous.
8. Page 1-7 – State what is meant by "enhancing the Delta ecosystem" under the section on Economy.
9. Section 1.6 should discuss how changes in disturbance regimes might affect the Delta and if they are likely to lead to key vulnerabilities in the system.
10. In Section 1.5, it ends with a strong policy statement whose connection to adapting to climate change is not clear to me. It says opportunities for return of land of tribal traditional homelands should be prioritized when feasible. My comment is not about the merits of this policy but why is it in a document on climate change adaptation. The link to adaptation should be made clear.

Additional Comments:

1. I was not aware that the Delta is considered a biodiversity hotspot.
2. I thought other state agencies had planners, engineers, scientists, and communicators. This document says that is unique to the Council (page 1-4).

Chapter 2: Outreach and Engagement

What is good?

1. Good explanation of the steps or stages of process of outreach and engagement that informed the plan.
2. Use of multiple methods for incorporating input (focus groups, meetings, COB outreach/workshops) and extensive outreach to tribes, growers and landowners.
3. Nice summary of key findings from the different methods of outreach
4. The explanation of the methods for social vulnerability, and findings are clear. Connecting implementation strategies to the key findings (pg. 2-9 and 2-10 and 2-11) is important.
5. The Antioch, Pittsburg, and Stockton examples are helpful.

What is missing?

1. Section 1 doesn't really address how the findings and input was incorporated into the plan. What was the process for ensuring that the diverse forms of knowledge and priorities were captured in the strategies identified?
2. It would be helpful to identify the outcomes from engagement with tribes.
3. No new incentives are mentioned (only "continue incentive programs" on page 2-7)

To improve?

1. Include the things mentioned in the What is Missing category
2. In section 2.1.5 include the tribal perspectives on climate adaptation concerns, recommended adaptation strategies, and considerations (instead of just saying these perspectives were heard). Details could be added similar to the way details are presented for the three socially vulnerable communities. Discuss the outcomes from engagement with tribes. Are any new incentives proposed?

Chapter 3: Strategy Development

What is good?

1. Explains how the CCVA informed the strategies generally (but not super specific here)
2. Tradeoffs identified are nicely explained.
3. Co-benefits explanation is good
4. Starting in Chapter 3, the idea and role of co-benefits becomes more clear. The first definition is on page 3-5.
5. The layout for chapters 4-7 is clear, succinct, and logical.

What is missing

1. Were there any formalized processes or methods used for the tradeoff evaluation? How were strategies that could mitigate the tradeoffs determined? For instance, a cost-benefit analysis for levee investments is mentioned on pg. 3-4, but methods or analytical approaches for other tradeoff considerations are not explained. If the methods were qualitative or based on expert-judgement or based on input from input from communities or affected parties, that should be explained.
2. In assessing co-benefits of potential strategies, were these done with communities? Or is the section on co-benefits meant to outline that co-benefits should be considered. As noted on pg. 3-5, “A community’s priorities, goals, and vulnerabilities should guide the consideration of co-benefits and the choice of strategies”. Was this done when developing the strategy profiles?
3. There is no mention of any kind of agriculture other than those that exist now.
4. Incentives are not discussed and only mentioned on page 3-6 under “Revert or Halt subsidence”
5. Here again is the assumption of reducing agriculture (page 3-3). Is that what is meant? All strategies lead to less agriculture?

To improve?

1. Include the things mentioned in the What is Missing category
2. Page 3-4 has a major statement of great importance. *Delta ecosystems need adequate and appropriate flows to function. However, restoring these flows can result in tradeoffs between different species needs as well as human uses such as water exports.* This is the driver of the Delta conflicts and perhaps should be elevated.
3. P 3.3 – I was surprised that the first sentence in Section 3.3 Evaluating Adaptation Tradeoffs in the subsection on Agriculture says, "Actions focused on preserving existing agriculture will maintain a key driver of the Delta's economy and jobs." I think the emphasis should be on adapting current ag practices to those more appropriate under changing conditions. Later this section notes the options of "switching to crops that provide many of the same ecosystem functions as a wetland, such as rice" (and I think it should also add the use of tulle for bioenergy – which would not require so much chemical applications as does rice production).
4. Page 3-5– Is food security an issue that Delta Adapts can /should address? (see my comments below for pages 6-1 and 6-7)? I suggest removing or editing this point.
5. The strategy should include incentives
6. On page 3-2 and in other places, the term "complex" is used. Is complex being used as the same as complicated? For some people, they mean the same and for others they have different meanings[2].

Chapter 4: Flood Risk Reduction Strategies

What is good?

The adaptation plan presents a holistic approach to managing flood risks in the Delta by combining infrastructure improvements, nature-based solutions, and proactive community engagement. The plan aims to create a climate-resilient future while addressing ecological and societal needs.

1. Emphasizes the complexity of flood dynamics in the Delta.

[2] The Critical Difference Between Complex and Complicated: https://sloanreview.mit.edu/article/the-critical-difference-between-complex-and-complicated/

2. Explores practical options for flood resilience, including modernizing levees, nature-based solutions, flood-resilient farming practices, land-use planning, upstream reservoir management, and flood warning systems.
3. Highlights the importance of collaboration among agencies and interdisciplinary teams for flood risk and emergency preparedness models.
4. Suggests the use of climate-adaptive solutions for retrofitting levees and adaptive levee designs supported by monitoring.
5. Appropriately integrates co-benefits such as land-use planning and water management into strategies.
6. Recommends flood protection prioritization based on factors such as social vulnerability, economic value, and risk management, aligning with the Delta Levee Investment Strategy.
7. Advocates for the development of advanced hydrologic modeling tools for flood forecasting.

What is missing?

1. The COEQWAL box insert does not clarify its role in managing future flood risks. Similarly, it is unclear how CalSim3 (a monthly model) contributes.
2. There is a lack of discussion on the varying roles of flood protection measures based on flood magnitude, particularly under future conditions. For example, nature-based solutions may only address smaller floods, while larger floods require expanded storage capacity upstream.
3. There is no clear explanation of how upstream storage expansion might be achieved, nor how future changes, such as more frequent atmospheric rivers, might overwhelm existing capacity.

To improve?

1. Include the things mentioned in the What is Missing category
2. Explore how flood protection measures can ensure dynamic resilience in response to climate change-induced non-stationarity.
3. Investigate significant increases in upstream storage capacity to address climate impacts.

Additional comments:

1. FL-3 in Chapter 4 seems to say that restoring ecosystems helps diversity as a co-benefit. Here is where "diversity" is used catch-all term for ecosystem services that are then listed later in the text.
2. On page 4-9 is a mention of monitoring and evaluation processes (FL-3-2) but it within the Flood Risk Reduction strategies. There is much more monitoring and evaluation needed than this but it not discussed.
3. FL-3-5 wants to streamline permitting for habitat restoration, while water-related permitting is a long process. Why should habitat be given a short-cut to the accepted process used for other actions?
4. Maybe explain how the Hazards Addressed in the green boxes directly relate to the primary benefits. If readers look at the green boxes, then they will see the bigger picture by knowing the primary and co-benefits.

Chapter 5: Ecosystem Strategies

What is Good?

1. ECO-2 is good because it clearly states ecosystem function and species-at-risk.

What is missing?

1. Chapter 5, which focused on ecosystem strategies, was also very broad and general. The recommendations are so broad that it's not possible to disagree with any of them, but at the same time they are so broad and general that I have a difficult time imagining them being very useful when it comes time to implement adaptation measures or when difficult decisions need to be made in assessing the relative merits of different options or the urgency or importance of various actions.
2. Draft Adaptation Plan largely avoids mentioning how important it is to supply sensitive habitats with high quality, i.e. unpolluted, water. Climate change will not only increase the dangers of temperature stress/low flows on aquatic species, multiple-stressor effects will also exacerbate the consequences of water pollution for vulnerable species. While habitat restoration and improved connectivity is critically important to help maintain or recover endangered species and species diversity in the Delta, these areas should be protected from

chemical pollution. The importance of providing unpolluted, "good quality" water for wildlife is of crucial importance. Habitat restoration efforts and conversion of agricultural land to more climate resilient crops may well fail in achieving desired outcomes unless pollution (=contamination at harmful levels) by chemicals used in agriculture, domestic and industrial effluents, and vector control activities is eliminated

3. Increased effluent treatment should be made compulsory and the cost of such measures should be included in an economic analysis. For agriculture, organic farming or the use of integrated pest management tools (the latter suggested in Chapter 6, p. 6-5) should be made compulsory on land that discharges tail water or runoff directly sensitive habitats; wastewater treatment plants must be upgraded to tertiary treatment at a minimum, ideally with additional treatment using ozonation or active carbon filtration. Urban areas in or adjacent to the Delta should also have to reduce surface runoff and associated contaminant discharge into Delta waters (which may have co-benefits by better infiltration/use of runoff water to increase green spaces).
4. The emphasis on habitat is good but habitat needs to be defined somewhere. It means different things to people. NOAA has a good definition that is part of Essential Fish Habitat.
5. ECO-1-10 refers to natural stream flows. Is that a well-known concept and the natural flows with the Delta are defined? How far back in time do we go to call the flows natural?
6. ECO-4 emphasizes urban. A brief rationale for this would help.

To Improve?

1. Include the things mentioned in the What is Missing category
2. ECO-1 seems to imply that all native species should thrive. This is not the case, as healthy ecosystems have species that dominate.
3. ECO-1-7 mentions invasive species, which will be a major problem under climate change. This may deserve more discussion.
4. ECO-3-7 repeats the streamlining of permitting for habitat restoration. Why is this justified?

Chapter 6: Agricultural Strategies

What is good?

1. Strategy descriptions are clear, partners are comprehensive, and equity points are relevant. The examples/case studies in the call-out boxes are well done and useful illustrations.
2. The knowledge of farmers is recognized.
3. Agritourism is an interesting option to explore
4. Co-benefits are discussed

What is missing?

1. The connection of climate smart agricultural practices to land subsidence in the Delta could be highlighted more in this chapter. Additionally, it could recognize where and when dry farming vs. wet farming might be appropriate (both are identified as options in AG1-7 on crop-switching).
2. Sustainable regional food system – AG-2 needs to recognize that this strategy assumes a highly diverse set of crops should and can be grown locally. The challenge seems to be that crop choices are often driven by market demands, prices, and climate feasibility for crops. How feasible is it to really build a sustainable local food system to increase food security when much of the decisions that would affect this system are driven by the market and private landowner choices?

To improve?

1. Include the things mentioned in the What is Missing category
2. The agricultural section comes across as a bit prescriptive in places, rather than acknowledging that farmers have different goals and capabilities on their farms. It could be helpful to discuss incentives as a way to encourage farmers to change behaviors in ways that could benefit the environment, if it makes sense for their farm. Voluntary incentives recognize the autonomy of farmers to manage their private businesses but also encourages them to make changes that enhance and protect resources. To more fully address incentives, I would consider mentioning the ability to leverage existing programs such as USDA's Environmental Quality Incentive Program (EQIP) and Conservation Reserve Program (CRP). Further, they have program rules

and structures to address some of the concerns about tradeoffs that are discussed in the report. Other non-profit organizations may also offer incentives and can be effective partners.

3. Page 6-1, 6-7 – Is food security an issue that Delta Adapts can /should address? The biggest problem of food security is local access to diverse and high-quality food. Waste and distribution (not production) are key problems. Page 6-7 says "actions to help connect locally grown foods to the local market also can improve equitable food access and affordability, increasing food security regionally." As the photo on page 6-8 shows, this approach is contrary to large areas of rice production (mentioned on page 3-3). I suggest deleting or greatly modifying how this topic is covered here and in the Executive Summary and Chapter 3
4. New cropping strategies should be considered – for example, as a form of paludiculture (p. 6-5) consider use of tulle for bioenergy to sequester carbon, provide a new crop for farmers, and need less chemicals than rice production.

Chapter 7: Water Supply Reliability Strategies

What is good?

1. This chapter reflects a critical, multi-pronged approach to securing water supply reliability in the face of climate change while addressing socio-political challenges.
2. Identifies future stresses to water supply, such as warming, reduced snowpack, altered runoff timing, precipitation variability, and rising sea levels.
3. Proposes commonsense strategies, including conservation, reuse, storage expansion, conveyance system improvements, reservoir operation modifications, and revisiting water quality standards.
4. Acknowledges disparities in impacts on vulnerable communities.
5. Suggests using UPWARD as a database for water rights to improve transparency in water management.

What is Missing?

1. Lacks quantitative information to help prioritize strategies effectively.
2. Does not sufficiently address the trade-offs among ecosystem, agricultural, and urban demands.
3. Fails to outline how water supply reliability impacts may evolve over time and how proposed strategies mitigate those changes.

To improve?

1. Include the things mentioned in the What is Missing category
2. Provide quantitative details demonstrating the relative benefits of strategies.
3. Prioritize actions according to criteria such as ease of implementation and cross-cutting benefits, as outlined in the Executive Summary.
4. Address implementation challenges, including financial, political, and regulatory hurdles.
5. Clarify the quantitative tools (e.g., modeling) needed to assess strategy benefits.
6. Include greater specificity and priority-setting based on screening-level modeling.

Chapter 8: Implementation Roadmap

What is good?

1. Chapter 8, which focused on the implementation roadmap was stronger. Because this chapter was organized by region, it focused in on specific challenges and potential strategies for adaptation that were sufficiently detailed to provide actionable guidance. I would recommend that the rest of the report aim to emulate some of the features of Chapter 8.
2. Differences in regions within the Delta are explained well and the report makes it clear why particular strategies might be prioritized in a particular region. It also helps clarify who or which agencies and parties should be involved in the implementation.
3. The visual roadmaps are nicely done.
4. The inclusion of out-of-delta strategies is important and the cross-cutting themes are helpful to see.

5. Mentions the challenges of water pollution in the North Bay, an area well suited for restoration, and encompasses sensitive fish habitat.
6. The idea of an Implementation Roadmap is excellent. The organization around regions within the Delta is reasonable but results in redundancy in the text, as much is repeated in each region. At this point, it is difficult to be more specific. The figures are also good and informative. I thought there would be more on trade-offs in an Implementation Roadmap. This issue was mentioned and then seemed to disappear. Perhaps trade-offs should be listed as cross-cutting theme?
7. Recognizes that individual regions in the Delta have unique challenges, considerations, and priorities, and therefore have unique appropriate adaptation strategies and specific agencies and interested parties.
8. The graphics showing the implementation roadmaps for each region are helpful.
9. Identification of cross cutting themes (section 8.6).
10. Recognizes that individual regions in the Delta have unique challenges, considerations, and priorities, and therefore have unique appropriate adaptation strategies and specific agencies and interested parties.
11. The graphics showing the implementation roadmaps for each region are helpful.
12. Identification of cross cutting themes (section 8.6).

What is missing?

1. Include the things mentioned in the What is Missing category
2. The focus on regional differences in adaptation is helpful but also leaves out other key considerations related to implementation, such as timing, political will, and resources.
3. Why does the implementation roadmap come before the governance chapter? Wouldn't there be key governance strategies that are specific to the agencies and parties identified in the sub-regions of the Delta?
4. This section fails to provide potential solutions for reducing pollutant input other than reviewing water quality standards. It is unclear what these standards are. On p. 8-6, water quality objectives are mentioned, but it is not clear what these are and who will review/update them.

5. For the North Delta - since nut trees require a lot of water and have a large amount of embedded water that is exported from the system, is it appropriate to encourage them?
6. For the Central Delta - why is rice planting the only wetland crop mentioned when paludiculture with native plants used for bioenergy could be a good opportunity (page 8-6)?
7. Why is partnerships with tribes only mentioned as a part of implementation in regard to the South Delta (on page 8-9). (In the other sections, tribes are noted to be interested parties)
8. Page 8-15 says that "Research and the need to integrate best available science are addressed in all four focus areas," however neither of these are mentioned in the earlier parts of chapter 8.

To improve?

1. Include the things mentioned in the What is Missing category
2. Should nut trees be promoted?
3. Discuss paludiculture using native species
4. Discuss partnerships with tribes in all sections
5. Discuss research and the need to integrate the best available science in each of the four focus areas.

Chapter 9: Costs and Benefits of Adaptation

What is good?

1. This chapter provides good context that the costs of prevention, through restoration, outweigh the costs of inaction. Compared to other chapters, this chapter is particularly clear about how recommendations were reached and how efforts can be prioritized based on data and qualitative criteria
2. Details on the costs of levee and ecosystem restoration are clearly explained.
3. The discussion on pg. 9-4 of studies that could be useful examples for quantifying additional ecosystem benefits of Delta Adapts strategies is helpful for future analysis.
4. The chapter recognizes that the costs and benefits of other strategies may need to be evaluated.

5. Recognition of the need for public investment in the strategies and the potential increasing costs of delaying such investments is an important point (section 9.2).

What is missing?

1. The methods or data for assessing benefits of levee improvements, and then determining the benefit-cost ratio, wasn't fully clear (pg. 9-4). Perhaps this could be described in an appendix.
2. Could lay out a recommended process by which costs and benefits of other strategies (that weren't the focus of this chapter) might be evaluated.

To improve?

1. Include the things mentioned in the What is Missing category
2. It would be helpful if statements about specific cost-benefit findings included a citation to a detailed analyses with detailed methods.
3. A broader analysis could be done that would evaluate whether, as climate change progresses, all assets can be maintained. Adaptive planning that is sustainable over time would examine risks far into the future and across multiple types of uncertainty to identify optimal and feasible investments.
4. The following statement, which represents a key theme of the chapter, embeds multiple concepts and might be clearer if broken apart into distinct ideas. "However, the more climate adaptation is delayed, the higher the price tag will be, both in terms of what is at risk and the costs of taking action, as many strategies take time to plan, permit, fund, and construct. Nature-based solutions, additionally, take time to reach their full potential."
5. Delays in planning and maturation of environmental restoration are probably not the primary reason that costs rise through inaction. The savings usually come from the lower costs of prevention compared to addressing problems after adverse events. The idea is that nature-based solutions take time to implement and mature suggest that effective foresight and planning are needed to ensure such solutions can address concerns as they arise. These distinct ideas could be more clearly represented throughout the chapter.

Chapter 10: Governance

What is good?

1. Nice explanation of the governance system in the Delta and its importance in ensuring that the adaptation process is equitable and goes "beyond government agencies".
2. Background on the historical factors affecting Delta Governance is also important to understand current challenges that shape the governance system.
3. The barriers and challenges to a justice-oriented approach to climate governance are nicely linked to the data from the community survey and interviews with key EJ and tribal interests.
4. Nice job presenting the data on the adaptation practitioners who would be relevant to adaptive management actions in implementing Delta Adapts. (Figure 10-1)
5. Best practices of governance are laid out in a way that's feasible for implementation.
6. It is useful to define governance.
7. It is helpful to describe existing governance challenges and best practices for participatory governance, outreach and education, and adaptive management.

What is missing?

1. What steps need to be taken specifically when implementing a given strategy to ensure that adaptive management is followed, while still remaining proactive? There is always a downside of adaptive management, which is the potential to delay or slow action to "wait for the best available science". How do you ensure both expediency/proactivity and adaptability of the plan?
2. Why aren't the steps for overcoming Delta governance challenges in section 10.4.2 elevated to strategies? It seems that governance often IS the key limitation when implementing strategic plans, particularly those dealing with uncertain threats like climate change. It seems like these steps should be prioritized more directly, as well as then connected to the implementation roadmap in Chapter 8. I would also recommend placing the governance chapter prior to the implementation roadmap so that it's clear how the implementation roadmap connects to the governance section.

3. The definition of climate change governance (1st paragraph on page 10-1) only mentions managing climate mitigation and adaptation. What about sea level rise and changes in disturbances regimes?
4. It is surprising that listening was not included in the list of best practices for successful governance (Section 10.4.1).

To improve?

1. Include the things mentioned in the What is Missing category
2. Include sea level rise and changes in disturbances regimes in the definition of climate change governance (1st paragraph on page 10-1).
3. Include active listening as part of best practices for successful governance (Section 10.4.1).

Chapter 11: Conclusions and Next Steps

What is good?

1. It is good to focus on the needs of the Delta's most vulnerable resident
2. This short chapter acknowledges that the identified strategies are only a "first step" toward adapting the Delta to climate change.

What is missing?

1. There is no conceptual diagram of key interactions and influences across the entire Delta.
2. While it effectively highlights climate change threats, challenges such as funding mechanisms and collaboration lack detail and specificity.

To improve?

1. Include the things mentioned in the What is Missing category
2. Page 11-1 - Since a holistic approach to understanding and management is called for in several places, it seems essential to develop a conceptual diagram of key interactions and influences across the entire Delta. This might be a graphic showing influences and feedback. It should be a part of the conceptual framework in Figure 1.1. DRERIP has some good diagrams for the Delta that includes stressors, etc.

3. Provide more case studies and, more importantly, a detailed roadmap for implementation.
4. Classify strategies based on criteria set out in earlier chapters and the Executive Summary.

Chapter 12: References

No comments from the Delta ISB.

Chapter 13 - Glossary

What is good?

1. It is good that a glossary is provided

What is missing?

1 Several key terms are not included in the glossary

How to improve deficiencies?

1. Include the things mentioned in the What is Missing category
2. Adaptive management should be included
3. Set-back levee needs to be moved to be in alphabetic order
4. Best available science should provide the 6 criteria mentioned. Also “Best available data” should be defined or not used in this definition.
5. Add the term restoration

Appendices

No comments from the Delta ISB.